sion, the occurrence and destructive effects of ball lightning can not be doubted, as has been attested by numerous witnesses, and made unpleasantly patent to the writer of the following narrative.

The summer of 1867 found me, then a mere boy, aboard the New Bedford whaling bark *Orray Taft*, outbound from the desolate harbor of Marble Island, in the northwestern corner of Hudson Bay, where the vessel had wintered in the ice from September until June, and whence she had resumed her cruise in Arctic waters after "blubber and bone." On the night of June 30 to July 1 the bark encountered a genuine hurricane, with the (for the latitude) unusual phenomenon of a violent thunderstorm. A rock-bound lee shore and the presence of floe ice in large quantities, with an occasional berg, necessitated the carrying of all the sail possible, in order to "claw off" from the rocks on the one hand, and steer clear of the madly heaving and tumbling ice masses on the other. At about 2 a. m. wind and rain ceased with startling suddenness, and the sky showed signs of clearing, though a portentous cumulus cloud or "thunderhead" still hung low over the troubled waters.

The sudden cessation of the uproar, together with the violent pitching and rolling of the ship, brought the captain to the companion hatch, whence he shouted the emphatic order "Stand by to wear ship," adding, somewhat profanely, "We'll catch h— presently from the opposite quarter." Inured as the crew of a whaler is sure to become to unusual and critical situations, and apathetic as the writer felt to the peril of the present one, he nevertheless had a distinctly uncanny sensation at this sudden transition from howling hurricane to dead calm, associated with a large degree of skepticism at the captain's assurance in predicting and preparing for a still more violent change to come; for he had never before passed through the center of a cyclone, and his theoretical knowledge of the laws of storms was decidedly limited. But the man or boy who, aboard a whaler, would let skepticism stand in the way of his prompt compliance with an order from the captain would find his berth an exceedingly unhealthy one, and would most likely have cause to regret the day of his birth; so all hands rushed to their proper stations, to "stand by and haul," as and when directed. Happening to secure the upper hold on the fore-topsail brace, the writer facing sternward, again noticed the evil-looking thunderhead apparently but a few yards above the mizzen truck, and, while waiting in silent expectancy for the things to come, saw a ball of fire, the size of a man's head, detach itself from the cloud and sail quite leisurely to the mizzen truck, striking which it exploded with a deafening crash and sent a shower of hissing sparks over rigging and deck.

Of the immediate consequences, save one, the writer can only speak from hearsay. When he regained consciousness, he found himself sitting, propped up against the weather side of the mainmast, paralyzed in the right half of his body, and his shipmates busily engaged, some in clearing away the wreckage of the shattered mizzenmast, others in sounding the pump to discover whether or not the bolt had knocked a hole in the vessel's bottom. The latter calamity was probably averted by the fact that the lightning had found an easier escape to the water by way of the anchor chains through the hawsepipes, as both anchors had been made ready to let drop in case of the vessel's inability to weather the rocks. The one exception above noted, and which he has accepted as a proof that the velocity of thought is greater than that of lightning, was his distinct realization, at the critical moment, that he had been struck by lightning and was being hurled to the deck, though consciousness failed him before he struck it. He also had time to formulate the thought, "Well, it is all over with you this time," and feel rather gratified at the supposed fact. There was absolutely no pain felt, not even an unpleasant sensation; on the contrary, he seemed to sink into an agreeably restful position, though, according to his shipmates' statements, he was hurled with great violence into the lee scuppers. Of the other men on deck, especially those having hold of the brace, every one was more or less shocked, but none were rendered insensible. The writer's uppermost hold on the rope had evidently deflected the greater part of the charge through his body. The paralysis of his right side was gradually succeeded by a prickling, tingling sensation, and the movement of his limbs had again become possible by the time the watch was told to go below. His former skepticism of the captain's prognostication had to be atoned for by a mental apology, for the hurricane began with increased fury, and from the opposite quarter, almost immediately after the lightning had struck the mast.

One rather amusing story was told of the third mate, whose station in wearing ship was forward of the windlass. Standing inside of a big coil of the anchor chain, along which the lightning flew so that it looked like a huge fiery serpent, the mate was said to have been swiftly turned around his own axis a number of times, looking more like a dancing dervish than a grim old tar, while the lightning followed the convolutions of the coil. When he had regained his breath, the profanity of the veteran whaleman was said to have bordered on the sublime.

At a later period, while in charge of the newly-established Signal Service station on the summit of Pikes Peak, the writer had ample opportunity to familiarize himself with many different manifestations of atmospheric electricity, but never again has he witnessed that mysterious and weird phenomenon known as ball lightning.

THE CLIMATE OF HARPOOT, TURKEY, IN ASIA.

By Prof. ELLSWORTH HUNTINGTON, Euphrates College, Harpoot, dated April 13, 1901.

The accompanying tables[1] show the climatic conditions of Harpoot, Turkey, in Asia, for the last three years. Harpoot is situated at the elevation of 4,550 feet near the top of a small mountain range, in latitude 38° 20′ north, longitude 39° 20′ east. Twenty miles to south are the Taurus Mountains, from 6,000 to 7,500 feet high. Fifty miles north is the Anti-Taurus Range, with an elevation of 10,000 feet. The part of the United States which most resemble Harpoot in climate and in many physical features is Colorado.

The central fact of the climate of this part of the world is the long dry season. Around Harpoot it lasts from the middle of June to the middle of October, four months. During this time there are almost no clouds, the average relative humidity is under 50 per cent, and dew is never formed. The heat is not usually excessive, and during two-thirds of the time the wind blows from the north or northwest. Dur-

[1] On December 22, 1897, Professor Huntington wrote to the Chief of the Weather Bureau from Euphrates College, Harpoot, saying that he had lately come to that place from the United States and was keeping a meteorological record and would try to induce those at other mission stations, ten or twelve in number, to keep a simple record of weather and rainfall. It may, therefore, be assumed that the data given in the following Table 1 represents the observations made by himself at Euphrates College. Professor Huntington says that no observations of the barometer are included because he has only an aneroid. The mean maximum and mean minimum temperatures are not given because two sets of thermometers were broken in transit and a third is now in use. The records kindly sent to the Weather Bureau from Mersivan by Prof. J. J. Manissadjian for the years 1892–1896 will be found on page 245 of the MONTHLY WEATHER REVIEW for June, 1897. The Editor can but hope that Professor Huntington will succeed in obtaining equally good records from all the mission stations in Asia Minor, and thus contribute greatly to our knowledge of the meteorology of that region. Special efforts should be made to secure continuously recording thermographs and barographs for some of these stations, such as are sold by Richard Frères in Paris at a low price and can be easily transported.

TABLE 1.—*Summary of weather record at Harpoot, Turkey, in Asia*, 1898–1900.

Latitude 38° 40′ north; longitude 39° 20′ east. Elevation, 4,550 feet.

1898.	Temperature.										Relative humdity, 2 p. m.	Dew-point, 2 p. m.	Precipitation, inches.			Mean cloudiness, per cent.	Prevailing wind.	Number of days.					Thunderstorms.	1898.
	7 a. m.	2 p. m.	9 p. m.	Mean.	Max.*	Date.*	Min.*	Date.*	Mean daily change.	Max. daily change.			Rain.	Snow.	Max. in 24 hours.			Clear.	Fair.	Cloudy.	With .01 in. precip.	Fog at Harpoot.		
January	14.9	21.5	17.0	17.6	33	7	0	28	2.91	14.5	88.9[a]	18.2[a]	1.59	15.9	0.40	28	n.	20	2	9	8	1	0	January.
February ...	28.0	33.2	29.9	30.3	42	11	18	1	2.62	10.5	78.1[e]	28.2[e]	1.80	8.0	1.20	67	e.	4	7	17	6	1	0	February.
March.....	31.3	40.9	34.9	35.5	59	28	10	12	2.32	10.9	68.1	28.7	3.78	23.2	0.95	53	e.	10	7	14	13	0	2	March.
April.....	46.0	56.8	49.8	50.6	72	23	30	§	4.02	13.5	51.8[m]	35.8[m]	2.66	0.5	1.29	49	nw..	7	14	9	5	0	1	April.
May.....	54.1	66.0[a]	56.7[c]	58.4	76	11	35	4	2.83	8.7	38.7[a]	39.0[a]	1.31	0.0	0.52	34	nw.	13	16	2	8	0	11	May.
June	59.9	73.7[a]	65.3	66.1	84	26, 30	42	23	3.75	11 3	32.6[a]	44.0[a]	0.10	0.0	0.07	18	n.	23	6	1	2	0	2	June.
July.....	73.7[b]	87.5[b]	78.5[b]	79.5	94	30	63	3, 7	2.10	8.8	35 0[j]	55.7[j]	0 02	0.0	0.02	2	n.	31	0	0	1	0	0	July.
August.....	69.0[b]	84.9[a]	75.2[b]	76.1	92	18	58	29	1.75	8.1	26.1[j]	41.5[j]	0.00	0.0	0.00	0	n.	31	0	0	0	0	0	August.
September..	60.3[d]	75.6[a]	66.6[a]	67.3	84	2	48	10	3.15	8.8	33.5[k]	44.3[k]	0.00	0.0	0.00	2	n.	30	0	0	0	0	0	September.
October.....	55.6	66.6[b]	59.3	60.2	78	1, 2	35	13	2.88	13.0	44.1[e]	40.5[e]	1.29	0.0	0.69	18	n.	23	2	6	4	0	3	October.
November ..	38.5[a]	49.2[a]	41.6	42.7	64	1, 2	18	23	2.30	9.2	27.9[a]	28.4[a]	0.58	4.5	0.40	25	n.	20	4	6	3	1	0	November.
December...	28.0	35.0	30.4	30.9	50	1	12	25	2.69	17.5	68.9[b]	25.8[b]	2.99	19.7	1.12	35	e.	19	1	11	10	0	0	December.
Average...	46.6	57.6	50.4	51.3	94†	.....	0†	.....	2.78	17.5†	49.5	35.4	16.12‡	71.8‡	1.29†	27	n.	231‡	59‡	75‡	60‡	3‡	19‡	Average.
1899.																								1899.
January.....	22.5	29.6	24.6	25.3	36	17	10	3	2.75	8.1	75.1	24.7	1.73	15.3	0.70	56	n.	13	3	16	10	1	0	January.
February....	27.8	34.7	29.5	30.4	42	13, 14	16	23	3.08	7.3	73.9[a]	28.7[a]	4.23	31.2	1.30	67	e.	7	3	18	13	1	0	February.
March ...	31.3	40.5	35.0	35.4	60	27	15	1, 2	2.51	10.3	67.3[d]	30.0[d]	3.77	12.1	2.12	44	e.	14	5	12	9	0	1	March.
April.....	45.6	55.7	48.7	49.7	72	18, 19	30	1	2.28	9.5	54.5[d]	36.0[d]	2.71	3.2	1.18	47	se.	11	7	12	16	0	5	April.
May.....	57.4	69.4[b]	61.4	62.4	86	31	43	5	3.11	9.4	38.6[b]	40.7[b]	2.17	0.0	0.93	24	nw.	19	8	4	9	0	4	May.
June...	62.5	76.1	66.6	67.9	88	§	47	14	3.46	13.5	31.4[a]	42.1[a]	1.11	0.0	1.00	19	nw.	21	5	4	5	0	2	June.
July.....	69.9[g]	86.4[l]	77.6†	77.8	93	6	56	1	.....	.....	25.5[a]	46.3[g]	0.00	0.0	0.00	2	n.	31	0	0	0	0	0	July.
August... ..	70.3[e]	84.2[g]	75.1[j]	76.2	94	5	57	17	2.31	8.7	35.5[n]	52.1[p]	0.00	0 0	0.00	3	n.	31	0	0	0	0	0	August.
September..	65.8	79.8[e]	70.7[e]	71.7	87	2	56	6	2.20	9.0	39.6[j]	50.8[j]	0.07	0.0	0.06	12	n.	26	2	2	2	0	1	September.
October.....	49.1[a]	58.6	52.2	53.0	78	1	31	28	3.64	22.8	66.9	44.7	5.55	0.0	2.26	35	n.	13	9	9	17	0	10	October.
November ..	38.2	47.5[a]	41.5	42.2	58	1, 5	18	28	2.33	13.5	63.1[e]	34.8[e]	1.44	0.1	0.60	40	n.	13	8	9	6	0	0	November.
December...	22.6	27.6	24.2	24.7	42	2	8	22	2.54	14.6	85.0[a]	23.9[a]	3.07	26.9	1.00	78	e.	5	4	22	18	10	0	December.
Average...	46.9	57.5	50.6	51.4	94†	.....	8†	.....	2.75	22.8†	54.7	37.9	25.85‡	83.6‡	2.26†	35	n.	208‡	54‡	108‡	105‡	12‡	23‡	Average.
1900.																								1900.
January.....	26.4	32.5	28.3	28.9	40	18	18	22	2.32	7.5	78.8[f]	27.2[f]	0.64	5.8	0.20	64	e.	9	2	20	8	6	0	January.
February....	31.0	37.9	33.9	34.2	48	22	18	6, 7	1.87	7.0	79.9	32.1	2.19	0.0	0.47	81	e.	1	5	22	8	6	0	February.
March.....	35.2	42.5	38.6	38 7	57	31	14	11	2.98	9.5	75.8[a]	34.7[a]	6.05	8.0	1.63	73	e.	3	9	19	16	0	2	March.
April.....	46.4[b]	56.8[f]	50.2	50.9	69	23	38	14	2.78	6.0	47.5[a]	37.7[a]	1.09	0.0	0.61	37	se.	12	11	7	9	0	1	April.
May.....	53.4	64.5[a]	56.7	57.8	72	§	41	3	2.99	6.2	44.0[a]	41.7[a]	1.98	0.0	0.69	45	nw.	10	12	9	12	0	2	May.
June..... ..	60.2[a]	72.8[b]	65.0[a]	65.7	82	‖	46	15, 16	3.75	14.7	39.5[d]	45.2[d]	1.55	0.0	0.92	17	nw.	21	5	4	6	0	6	June.
July.....	71.2[a]	83.2[g]	75.4	76.0	91	13	63	5	2.42	5.8	26.8[b]	48.2[b]	0.00	0.0	0.00	5	n.	29	2	0	0	0	0	July.
August	70.4	82.9[b]	74.5[j]	75.6	90	16	62	29	2.52	6.2	27.1[e]	43.5[e]	0.07	0.0	0.07	4	nw.	29	2	0	1	0	1	August.
September..	60.0[b]	73.1[j]	64.2[k]	65.4	85	1	49	16	2.44	8.5	31.1[m]	38.0[m]	0.44	0.0	0.27	10	nw.	26	2	2	3	0	1	September.
October .. .	52.7	64.9	57.8	58.2	76	5	41	27	2.35	9.7	47.5[b]	42.2[b]	0.80	0.0	0.34	27	nw.	21	5	5	5	0	4	October.
November ..	37.6[d]	47.5[e]	41.3[b]	42.0	59	1	33	9, 12	1.78	10.0	53.6[j]	29.4[d]	0.87	0,0	0.36	29	nw.	20	2	8	2	0	0	November.
December...	32.2[b]	37.0[b]	33.7[b]	34.2	49	3	20	28, 29	1.96	6.5	85.1[e]	32.9[e]	2.92	7.2	0.97	62	e.	8	5	18	10	5	0	December.
Average...	48.1	57.9	51.6	52.4	91†	.....	14†	.....	2.51	14.7†	53.1	37.7	18.10‡	21.0‡	1.63†	38	nw.	189‡	62‡	114‡	88‡	17‡	17‡	Average.
AVERAGE FOR 1898–1900.																								
January.....	21.3	27.9	23.3	23.9	40	.....	0	.....	2.66	14.5	78.8	24.5	1.32	12.3	0.70	50	e.	14	2	15	9	3	0	January.
February....	28.9	35.3	31.1	31.6	48	.....	18	.....	2.52	10.5	77.3	29.7	2.74	13.0	1.30	72	e.	4	5	19	9	3	0	February.
March.....	32.6	41.3	36.2	36.6	60	.....	10	.....	2.60	10.9	70.4	31.1	4.53	14.4	2.12	57	e.	9	7	15	13	0	2	March.
April.....	46.0	56.4	49.6	50.4	72	.....	30	.....	3.08	13.5	51.6	35.6	2.15	1.2	1.29	44	se.	10	11	9	10	0	2	April.
May.....	55.0	66.6	58.3	59.5	86	.....	35	.....	2.98	9.4	40.4	40.6	1.82	0.0	0.93	35	nw.	14	12	5	10	0	6	May.
June.....	60.9	74.2	65.6	66.6	88	.....	42	.....	3.65	14.7	34.5	43.8	0.92	0.0	1.00	17	nw.	22	5	3	4	0	3	June.
July.....	71.5	85 2	77.0	77.7	94	.....	56	.....	2.26	5.8	29.4	48.5	0.01	0.0	0.02	3	n.	30	1	0	0	0	0	July.
August.....	69.9	82.9	73.6	75.0	94	.....	57	.....	2.19	8.7	28.4	44.3	0.02	0.0	0.07	2	n.	30	1	0	0	0	0	August.
September..	61.6	76.5	67.3	68.2	87	.....	48	.....	2.60	9.0	35.0	45.1	0.17	0.0	0.27	8	n.	27	2	1	2	0	1	September.
October.....	52.4	63.4	56.5	57.2	78	.....	31	.....	2.96	22.8	52.8	42.5	2.55	0.0	2.26	27	n.	19	5	7	9	0	6	October.
November ..	38.1	48.1	41.1	42.3	64	.....	18	.....	2.14	13.5	52.4	30.4	0.80	1.5	0.60	31	n.	18	4	8	4	0	0	November.
December...	27.6	33.2	29.4	29.9	50	.....	8	.....	2.40	17.5	79.7	27.5	2.99	17.9	1.12	57	e.	11	3	17	13	5	0	December.
Average...	47.3	57.7	50.9	51.9	94†	.....	0†	.....	2.68	13.6	62.6	38.0	20.02‡	60.5‡	2.26†	34	n.	208‡	58‡	99‡	83‡	11‡	20	Averge.

*From observed readings of dry thermometer. †Extremes. ‡Total. §3 days. ‖5 days. Small letters indicate the number of observations that are missing.

ing most of the remaining third it blows from the south or southwest. These latter winds are hot and disagreeable. Usually they are strong and fill the air with dust. They blow for several days at a time and are often followed by a shower on the Anti-Taurus Mountains. Then a cool wind springs up from the north and the air becomes wonderfully clear. The clearness of the atmosphere is one of the most characteristic features of the climate. At Harpoot the mean annual cloudiness amounts to only 34 per cent. Haze is very rare. Usually the blue of the sky extends in almost undiminished deepness clear to the horizon. The lines and wrinkles on the sides of the mountains 50 miles away seem as clear as those that are but a tenth as far.

The extreme range of temperature during the three years has been 94°, from 0° to 94°, and the average monthly range has been 43°. This, however, does not adequately represent the equability of the climate. Sudden changes are almost unknown. The average daily range of temperature is about 17°. Of greater significance is the fact that the average change from day to day is only 2.7°. Often, for ten days at a time, the mean daily temperature increases at the rate of 1° more or less per day, and then for three or four days falls as steadily, though more rapidly, at the rate of 3° or 4° per day. Storms rarely last more than one day. Weather prediction will be an easy matter here; indeed so regular and moderate are all changes that the people pay no attention to them, except at the time of the spring and autumn rains.

From the middle of April to the middle of October there is no frost, and often there is none from the 1st of April to the end of October. Plowing on the plain, 1,200 to 2,000 feet below Harpoot, begins in February, and the cotton harvest is not finished till well on in the month of November. The rainfall is sufficient in quantity for all sorts of agriculture, but owing to its uneven distribution through the year,

irrigation is everywhere necessary. It is carried on in the most primitive way, and no attempt is made to conserve the supply of water, either by making reservoirs or by planting trees on the mountains, which are everywhere deforested. Many, perhaps half, of the fields that are in use, have no water supply, and are planted on the chance that the rain may be abundant; consequently in dry years there is a great deal of distress.

WINTER FOG AT HARPOOT.

The one extreme feature of the climate of Harpoot is the winter fog, and in this it can compete with the world. A description of a fog which occurred in January, 1901, will show its nature. It must be remembered that Harpoot is built on the top of a mountain and overlooks a large plain, the valley of the south branch of the Euphrates, from 1,200 to 2,000 feet below.

Five days ago [i. e., January 29—Ed.] after a light snowstorm the wind shifted to the northwest, and toward evening we had a few hour of fine weather. The air was damp but perfectly clear, and two hours after sunset the mountains, 20 miles away, could be seen by the light of the new moon. But soon, as the air grew colder, fog began to form below us, and by 9 o'clock had enveloped Harpoot. Since then it has continued without a break. Everything is white and dreary. Twenty feet away objects look hazy, and, at the best, everything is swallowed in fog at a distance of 100 yards. At times nothing can be seen at half that distance. Sounds and voices come from all directions with a perplexing clearness. In riding or walking one feels as though he were close to the edge of a yawning abyss. In many places the streets are covered with a thin invisible coating of ice, and people fall frequently. No one stirs from home unless compelled to. In a fog to lose the path on these bleak mountains or treeless plains is fatal. The villagers do not dare to try to come to the city, and often customers are so few and the shops so cold that business even in the city is wholly suspended. The air is almost still, but what little wind there is chills one through and through. In the orchards every branch and twig is covered with a dainty furry coat of fine and very perfect snow crystals. As the days go by this grows thicker and little white spires shoot out here and there. On the lee side these increase in size and number until a twig a quarter of an inch thick becomes a white club 4 inches or more in diameter. When a disconsolate bird lights on a branch he causes a snowstorm below him. If a breeze springs up, the crystals soon lie on the ground as snow an inch deep. After five days of fog our whole world is white. One sees white houses, white fields, white trees, a white sky, white horses, white men. It is beautiful, and once seen is never to be forgotten.

Two or three days later there is a morning when the light comes early. The sky is blue overhead and all around the horizon there are bands of purple, pink, and red. The mountains stand out sharp and white for half their height, and soon a high one 30 miles west is tipped with delicate pink. The fog has gone from above, but the foot of the mountain and all the plain are still shrouded in mist. It is no longer dull, but bright and glorious. It is a genuine sea of fog with islands rising here and there. All around it joins the mountains in an even line. Its surface is agitated by great waves a hundred feet high and a third of a mile long. The sunlit side is pink and gold and the shady side is dull gray. Slowly they rise and fall, pouring into every little valley and flowing out again. One can almost see the breakers; white jets rise like spray with a slow and stately motion. All day the fog oscillates back and forth just below Harpoot. Sometimes the waves move slowly, a complete rise occupying half an hour. At other times the waves are smaller and take but half as long a time. A few people in mountain observatories may be familiar with this wonderful sight, but no other city in the world can boast of anything like it. The sad thing is that not one in a hundred of the inhabitants even realizes that it is beautiful.

This fog is confined to the great valley between the Taurus and Anti-Taurus ranges and usually occurs when both the plains and the mountains are covered with snow. The valley extends from Malatia to Mush. It is 75 miles wide and 200 miles long. The fog photographs taken at Mount Tamalpais and recently published in the MONTHLY WEATHER REVIEW show just such scenes as are frequently seen at Harpoot. The time during which the fog remains unchanged varies from one to ten or even twelve days.

During the winter of 1900–1901 an attempt was made to investigate the movement and formation of the fog. The winter was very open and less fog was experienced than usual. At five places beside Harpoot records were kept of the occurrence and height of the fog. From these the accompanying diagrams on Chart X have been constructed. The temperature curves represent the maximum, minimum, and mean as recorded at Mezereh by Rev. Père Marc, Capucin Missionaire Apostolique, who has kindly placed his observations at the writer's disposal, and at Harpoot by the writer. Officially registered maximum and minimum thermometers were used in both cases. Mezereh is 2½ miles southwest of Harpoot and is 1,250 feet lower. The barometric curve represents the readings of an aneroid as recorded at Harpoot. The shaded areas of the lower diagram show the date of the occurrence of fog and the elevation of the top and bottom of the fog on each successive day. Thus, on January 21, the first fog of the year was formed at the level of the Euphrates River, 2,500 feet. Next day the fog had increased so that all the plain from an elevation of 2,500 to 3,800 feet was covered. On this day Mezereh was in the fog, but Harpoot was not. On the 23d the fog was still higher, reaching a point but slightly below Harpoot. After that it slowly descended until the storm of the 27th and 28th. The marked inversion of temperature at the time when Harpoot was in the sunshine and Mezereh under the fog will be noticed. The maximum inversion occurred on the nights of January 25 and 26, when it amounted to 15° C. and 14.6° C. (27° F. and 26° F), respectively, which is equal to two and one-sixth degrees Fahrenheit per 100 feet of descent. Another remarkable instance of inversion occurred on the morning of December 11, 1900. The writer spent the night at the village of Ichmeh, on the edge of the plain, at an elevation of 3,000 feet. During the night fog formed on the lower part of the plain, the top being 100 feet below Ichmeh. At 7 a. m. the temperature was 46° F. and the air was perfectly clear overhead. An hour and a quarter later, at an elevation of 2,550 feet, in the lowest part of the plain and at a distance of only 2 miles from Ichmeh, the same thermometer showed a temperature of 32° F. when exposed in the fog. The inversion in this case amounted to 3.1° F. per 100 feet of descent.

On January 29, 1901, was formed the fog which has been described at some length above. In this case instead of an inversion of temperature between Harpoot and Mezereh we find a remarkably close agreement. Both places were included in the cooling which caused the fog. On February 5, however, when the fog descended below Harpoot the inversion at once became apparent. The last fog of the season began on February 15, and because of the warmth of the air was irregular in its motions. The inversion of temperature which gave rise to it was confined to the nights and hence is only evident in the minimum curves.

From the limited observations that have been made the fog seems to be divisible into two types. In the first a snowstorm is followed by two or three clear, cold days, with falling temperature. The low plains rapidly radiate their heat and become much colder than the mountains, and at last condensation begins. This takes place first over the Euphrates River where the absolute humidity is highest. It spreads first along the smaller streams and then over the plains. As the fog thus rises it appears to flow like water. Gradually its thickness increases until it reaches a maximum of more than 2,000 feet and covers an area of five or six thousand square miles. The upper surface of the fog rises and falls in fairly close agreement with the rise and fall of the barometer. When a cyclonic area of low pressure comes the fog is dispersed, sometimes with precipitation and sometimes without.

The second type is also formed after a snowstorm, but in this case the clear weather between the storm and the fog lasts but a few hours. While the relative humidity is yet high on account of the storm, night comes on and radiation into the clear air is rapid. This process is most active about

half way up the mountains and here condensation soon begins. The clouds or fog thus formed prevent further radiation from below. Hence, the dew-point is not reached at lower levels and the fog does not descend to the plain. This fog continues like the first type, but disappears as it came, by breaking up into clouds at about the elevation where it was formed. These clouds are gradually dissipated into the surrounding air. Between these two types there is every gradation.

THE RAINFALL OF THE EUPHRATES BASIN.

In connection with the rainfall of Harpoot, attention should be called to that of the Euphrates basin as a whole, including its two great branches, the Tigris and the Karun rivers, which join it to form the Shat-el-Arab. The figures given by the few authorities that it has been possible to consult are as follows:

Chambers's Encyclopedia: Area of basin of Shat-el-Arab, 108,000 square miles.

Alden's Encyclopedia: Area of basin of Shat-el Arab, 108,000 square miles.

Redway and Hinman; Natural Advanced Geography: Area of basin of Shat-el-Arab, 490,000 square miles.

Redway and Hinman: Total annual rainfall, 60 cubic miles.

Redway and Hinman: Average annual rainfall, 7.8 inches.

Guyot, as quoted in Johnson's Encyclopedia: Area of basin of Shat-el-Arab, 255,000 square miles.

Maury; Manual of Geography: Area of basin of Shat-el-Arab, 250,000 square miles.

The last two authorities seem to be nearly correct, although a careful estimate of the area as given on Kiepert's map gives a total of 305,000 square miles. This latter figure includes two areas which may have been left out in the other estimates. The first is the basin of Lake Van, which has an area of 8,500 square miles. The lake has no visible outlet. It lies between the upper waters of the Tigris and Euphrates rivers, and is steadily rising, so that in time it will probably overflow to one of them. The other area which may have been omitted is part of Arabia, which belongs to the basin, although its rainfall all evaporates before reaching the river.

Data as to the rainfall of the Euphrates basin are very scanty. Redway and Hinman give the average annual 7.8 inches. The following are all that it has been possible for me to obtain:

Stations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
Harpoot	1.32	2.74	4.53	2.15	1.82	0.92	0.01	0.02	0.17	2.55	0.80	2.99	20.02
Aintab	3.56	3.48	2.91	2.48	1.38	0.21	0.08	0.02	0.02	0.82	3.32	4.55	22.71
Mosul	3.19	2.36	1.54	1.58	0.24	0.04	0.00	0.00	0.00	0.51	0.67	3.05	12.18
Baghdad	1.57	2.48	1.93	1.18	0.28	0.02	0.00	0.12	0.02	0.04	1.02	1.97	10.63
Marsovan	1.14	1.29	2.02	2.67	2.68	2.95	0.40	1.24	0.47	1.78	1.04	1.33	19.01
Bushire	3.39	2.52	0.87	0.59	0.02	0.00	0.00	0.00	0.00	0.12	2.16	3.70	13.37

Of these six places the last two are not included in the Euphrates basin, but as they are comparatively near they have been inserted for comparison. The higher eastern parts of the Taurus and Anti-Taurus ranges near Van and Mush have a decidedly heavier precipitation than the western part. The 305,000 square miles which drain to the Shat-el-Arab may be roughly divided into four sections, as follows:

I. Mesopotamia from east of the Persian frontier to the Arabian Desert. Area, 165,000 square miles. Average annual rainfall, 12 inches. Total quantity of water, 32 cubic miles. The mountainous eastern part of this region receives more than 12 inches and the western part toward the desert less.

II. The southern and eastern part of the Zagros Mountains and Mesopotamia from Jesireh to Diarbekir. Area, 60,000 square miles. Average rainfall, 16 inches. Total quantity, 15 cubic miles.

III. Central part of Zagros Mountains and western part of Taurus and Anti-Taurus Mountains, including Aintab, Diarbekir, Harpoot, etc. Area, 42,000 square miles. Average rainfall, 21 inches. Total quantity, 14 cubic miles.

IV. Taurus and Anti-Taurus Mountains northeast of a line from Egin to the mountains south of Bitlis. Area, 38,000 square miles. Average rainfall, 24 inches. Total quantity, 15 cubic miles.

Sum: Total area, 305,000 square miles. Average rainfall, 15.9 inches. Total quantity of water, 76 cubic miles.

This estimate may be modified in two respects. The lack of rain on the border of the Arabian Desert may reduce the average for Mesopotamia to less than 12 inches. The heavy precipitation on the mountainous district around Lake Van may increase the average for the fourth division. Until further data are procured the two may be regarded as offsetting each other.

CLIMATOLOGICAL DATA FOR JAMAICA.

Through the kindness of Mr. Maxwell Hall, the following data are offered to the MONTHLY WEATHER REVIEW in advance of the publication of the regular monthly weather report for Jamaica:

Jamaica, W. I., climatological data, June, 1901.

	Negril Point Lighthouse.	Morant Point Lighthouse.
Latitude (north)	18° 15′	17° 55′
Longitude (west)	78° 23′	76° 10′
Elevation (feet)	33	8
Mean barometer 7 a. m.	29.913	29.918
Mean barometer 3 p. m.	29.886	29.895
Mean temperature 7 a. m	79.8	.....
Mean temperature 3 p. m	81.6	.....
Mean of maxima	86.5	.....
Mean of minima	74.6	.....
Highest maximum	89.0	.....
Lowest minimum	70.0	.....
Mean dew-point 7 a. m	73.5	.....
Mean dew-point 3 p. m	74.9	.....
Mean relative humidity 7 a. m.	81.0	.....
Mean relative humidity 3 p. m.	80.0	.....
Total rainfall (inches)	9.51	13.00
Average wind direction 7 a. m	ese.	e.
Average wind direction 3 p. m	se.	e.
Average hourly velocity, miles 7 a. m	9.3	9.0
Average hourly velocity, miles 3 p. m	11.9	13.0
Average cloudiness (tenths):		
7 a. m. Lower clouds	1.5	3.1
7 a. m. Middle clouds	2.0	2.4
7 a. m. Upper clouds	3.6	1.2
3 p. m. Lower clouds	5.6	3.0
3 p. m. Middle clouds	3.1	2.3
3 p. m. Upper clouds	0.7	1.1

NOTE.—The pressures are reduced to standard temperature and gravity, to the Kew standard, and to mean sea level. The thermometers are exposed in Stevenson screens.

Comparative table of rainfall for each geographical division.

Divisions.	Relative area.	Number of available stations.	Rainfall. Average for May.	Rainfall. Current for May, 1901.
Northeastern division	25	22	8.05	17.52
Northern and subcentral division	22	55	4.51	8.23
Western-central division	26	26	8.02	14.95
Southern division	27	31	4.70	15.39
General means			6.32	14.03

In taking the average rainfall Mr. Hall uses only those stations for which he has several years of observation, so that the column of averages represents fairly well the normal rainfall for each division, while the column for the current month represents the average rainfall at those same stations. The relative areas of the division is very nearly the same and is given in the following table as expressed in percentages of the total area of Jamaica. The number of rainfall stations utilized in each area varies slightly from month to month, according as returns have come in promptly or not, but will not differ greatly from the numbers in the second column of the table.